

*PSEUDANTHESSIUS NEWMANAE*, NEW SPECIES (COPEPODA:  
POECILOSTOMATOIDA: PSEUDANTHESSIIDAE) FROM MARINE  
TURBELLARIANS IN AUSTRALIA

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*Pseudanthessius newmanae*, a new species of poecilostomatoid copepod, is associated in Australia with the marine turbellarians *Tythosoceros lizardensis* Newman & Cannon (in press) and two undescribed species of *Pseudobiceros*. The female of the new copepod may be distinguished from its 37 congeners by a combination of characters: the length of the body, the length to width ratio of the caudal ramus, and the shape of the genital double-somite. This is the second species of *Pseudanthessius* recorded as associated with Turbellaria. □  
*Pseudanthessius*, Copepoda, Poecilostomatoida, associates, Turbellaria, Australia.

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Most of the 37 species in the genus *Pseudanthessius* are associated with marine invertebrates (polychaetes, bivalves, asteroidea, echinoids, ophiuroids, crinoids, and holothurians). *Pseudanthessius nemertophilus* Gallicin, 1936, lives with a nemertean, *Lineus longissimus* Sowerby, on the Atlantic coast of France. Only one species, *Pseudanthessius latus* Illg, 1949, is associated with Turbellaria (with *Cryptophallus magnus* Freeman, now known as *Kaburakia excelsa* Bock, in Washington and California).

This paper contains the description of a second species of *Pseudanthessius* living with marine turbellarians, this time in Australia.

#### MATERIALS AND METHODS

The copepods, collected by Dr Leslie J. Newman, were preserved in 70% ethanol. They were measured and studied in lactic acid, according to the method described by Humes & Gooding (1964). All figures were drawn with the aid of a camera lucida. The letter after the explanation of each figure refers to the scale at which the figure was drawn.

Order Poecilostomatoida Thorell, 1859  
Family Pseudanthessiidae  
Humes & Stock, 1972  
Genus *Pseudanthessius* Claus, 1889

*Pseudanthessius newmanae*, sp. nov.  
(Figs 1a-g, 2a-k, 3a-j)

MATERIAL EXAMINED. HOLOTYPE. QMW21831, ovigerous ♀, from the polyclad turbellarian

*Pseudobiceros*, undescribed species, under rubble, in a depth of approximately 5m, between South Island and Palfrey Island, Lizard Island lagoon, Queensland, Australia, 14°40'S, 145°28'E, L. Newman and A. Flowers collectors, 5 April 1995. ALLOTYPE: ♂ (QMW21830), from *Pseudobiceros*, undescribed species, sublittoral, under rubble, South Passage, Coral Bay, Eel Bommie, Western Australia Australia, L. Newman and A. Flowers collectors, 5 May 1996. PARATYPES. nonovigerous ♀, QMW21349, same data as for holotype. 2 ♀♀, (1 in QM W21348, other dissected, in the collection of the author), from *Tythosoceros lizardensis* Newman & Cannon, in press, low water mark, South Island, Lizard Island lagoon, Queensland, Australia, 14°40'S, 145°28'E, L. Newman and A. Flowers collectors, 31 March 1995. 1 ♀, QMW21398, from *Tythosoceros lizardensis*, under rubble, sublittoral, in a depth of 6m, South Passage, Coral Bay, 'Eel Gardens', Western Australia, Australia, L. Newman and A. Flowers collectors. 4 May 1996. 2 ♀♀, QMW21399, 1 ♂ (QMW21399), from *Pseudobiceros*, undescribed species, sublittoral, under rubble, South Passage, Coral Bay, Eel Bommie, Western Australia Australia, L. Newman and A. Flowers collectors, 5 May 1996.

DESCRIPTION. Female (description based on specimens from *Tythosoceros lizardensis* at Lizard Island): Body (Fig. 1a) elongate. Average length (not including setae on caudal rami) 1.44mm (1.34-1.54mm) and greatest width 0.66mm (0.60-0.72mm), based on 4 specimens. Greatest dorsoventral thickness 0.35mm. Somite bearing leg I separated from cephalosome by dorsal transverse furrow. Epimera of metasomal somites posteriorly rounded. Ratio of length to width of prosome 1.58:1. Ratio of length of prosome to that of urosome 1.46:1.

Somite bearing leg 5 (Fig. 1b-d)  $70 \times 172 \mu\text{m}$ . Genital double-somite in dorsal view  $190 \times 172 \mu\text{m}$ , ratio 1.05:1, somewhat swollen laterally in anterior two-thirds, but with sides subparallel in posterior third (width  $115 \mu\text{m}$ ). Genital areas located dorsolaterally near middle of double-somite, each area bearing 2 very unequal setae  $31 \mu\text{m}$  and  $14 \mu\text{m}$  and minute process (Fig. 1d). Three postgenital somites from anterior to posterior  $88 \times 102$ ,  $73 \times 94$ , and  $81 \times 82 \mu\text{m}$ .

Caudal ramus (Fig. 1e)  $112 \times 39 \mu\text{m}$ , ratio 2.87:1. Outer lateral seta  $62 \mu\text{m}$ , dorsal seta  $27 \mu\text{m}$ , both smooth. Outermost terminal seta  $96 \mu\text{m}$ , innermost terminal seta  $140 \mu\text{m}$ , and 2 median terminal setae  $308 \mu\text{m}$  (outer) and  $462 \mu\text{m}$  (inner), all with lateral setules.

Body surface smooth, but few minute refractile points on caudal ramus (Fig. 1e).

Egg sac (Fig. 1f) elongate, multiseriate,  $995 \times 297 \mu\text{m}$ , ratio 3.35:1. Eggs  $68 \mu\text{m}$  in average diameter (range  $62\text{--}70 \mu\text{m}$ ).

Rostral area subquadrate (Fig. 1g). Antennule (Fig. 2a)  $320 \mu\text{m}$  long. Lengths of its 7 segments (measured along their posterior nonsetiferous margins): 16 ( $47 \mu\text{m}$  along anterior margin), 101, 26, 52, 49, 31, and  $18 \mu\text{m}$ , respectively. Formula for armature: 4, 13, 6, 3, 4 + 1 aesthetasc, 2 + 1 aesthetasc, and 7 + 1 aesthetasc. Several setae unusually long, all smooth. Antenna (Fig. 2b) 4-segmented, with armature 1, 1, 3, and II + 4. Third segment  $27 \mu\text{m}$  along outer side,  $22 \mu\text{m}$  along inner side; fourth segment  $35 \mu\text{m}$  along outer side and  $43 \mu\text{m}$  along inner side. Two claws slender,  $40 \mu\text{m}$  and  $53 \mu\text{m}$ . All elements smooth.

Labrum (Fig. 2c) with 2 elongate linguiform lobes. Mandible (Fig. 2d) with constricted proximal area followed on concave side by transverse row of long spinules, and on convex side by 2 small spiniform processes and minute spinules.

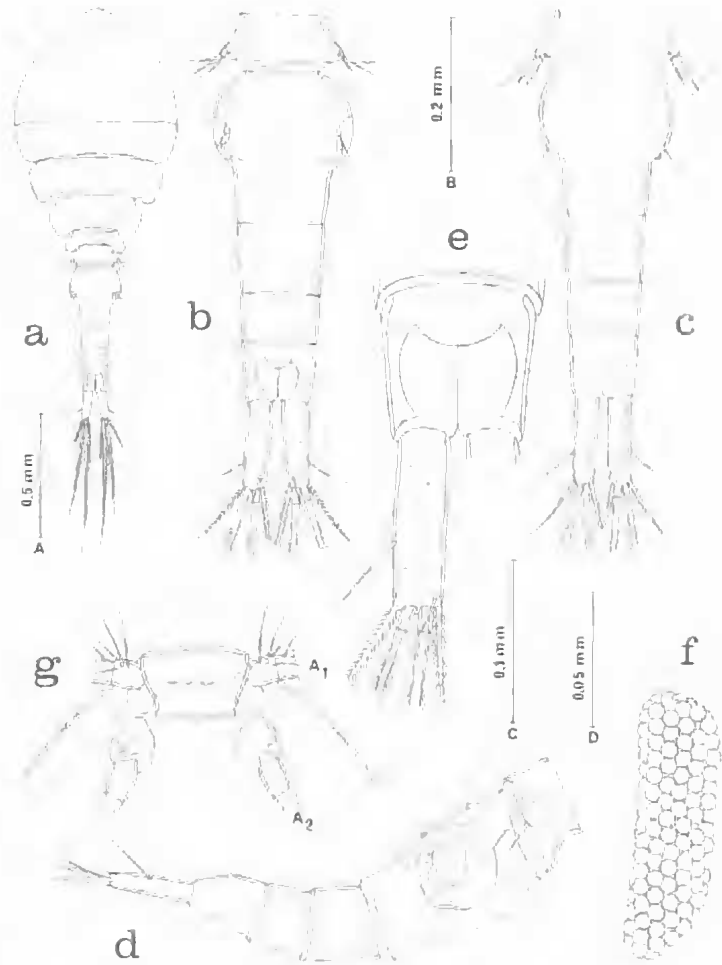


FIG. 1. *Pseudanthessius newmaniae*, new species. Female. a, body, dorsal (scale A); b, urosome, dorsal (B); c, urosome, ventral (B); d, urosome, lateral (B); e, anal somite and caudal ramus, dorsal (C); f, egg sac, ventral (D); g, rostral area, ventral (B). A1 = antennule, A2 = antenna.

Lash tapered with very small lateral spinules. Paragnath small lobe. Maxillule (Fig. 2e) with 4 setae. Maxilla (Fig. 2f) with unarmed proximal segment; distal segment with outer small smooth seta and long inner seta bearing unilateral setules. Lash long with outer row of graduated spines. Maxilliped (Fig. 2g) 3-segmented. First segment unarmed, swollen second segment with 2 setae, and small third segment with 2 minute setae and terminating in pointed tip.

Ventral area between maxillipeds and first pair of legs (Fig. 2h) slightly protuberant.

Legs 1-4 (Figs 2i-k, 3a) with 3-segmented rami except 1-segmented endopod in leg 4. Table 1 shows the formula for armature (Roman numerals indicating spines, Arabic numerals representing setae).

Third segment of endopod of leg 1 with outermost seta rather spinelike (Fig. 2i). Leg 4 (Fig. 3a) with exopod  $180\mu\text{m}$ . Endopod  $114 \times 36\mu\text{m}$ , ratio 3.17:1, its 2 terminal fringed spines  $75\mu\text{m}$  (outer) and  $101\mu\text{m}$  (inner). Anterior surface of endopod with slight incomplete suggestion of division. Both sides of endopod with long lateral hairlike setules.

Leg 5 (Fig. 1d) without free segment, consisting of slight ridge bearing 2 setae  $52\mu\text{m}$  and  $49\mu\text{m}$ , and adjacent seta  $50\mu\text{m}$ . All setae smooth.

Leg 6 represented by 2 setae,  $31\mu\text{m}$  and  $14\mu\text{m}$ , on genital area (Fig. 1d).

Color of living specimens unknown.

Male (description based on specimens from *Pseudobiceros*, undescribed species, in Western Australia): Body (Fig. 3b) with prosome more slender than in female. Length  $1.12\text{mm}$  ( $1.07\text{--}1.19\text{mm}$ ) and greatest width  $0.32\text{mm}$  ( $0.29\text{--}0.36\text{mm}$ ), based on 3 specimens. Greatest dorsoventral thickness  $0.25\text{mm}$ . Ratio of length to width of prosome 1.79:1. Ratio of length of prosome to that of urosome 1.31:1.

Somite bearing leg 5 (Fig. 3c)  $36 \times 86\mu\text{m}$ . Genital somite elongate,  $130 \times 102\mu\text{m}$ , longer than wide; in lateral view (Fig. 3d)  $133 \times 101\mu\text{m}$ . Four postgenital somites from anterior to posterior  $57 \times 63$ ,  $60 \times 57$ ,  $52 \times 52$ , and  $52 \times 52\mu\text{m}$ .

Caudal ramus (Fig. 3c) resembling that of female but smaller,  $73 \times 25\mu\text{m}$ , ratio 2.92:1.

Rostrum, antennule, antenna, labrum, mandible, maxillule, and maxilla similar to those in female. Maxilliped (Fig. 3e) with second segment bearing 2 setae and 2 rows of spinules. Claw (Fig.

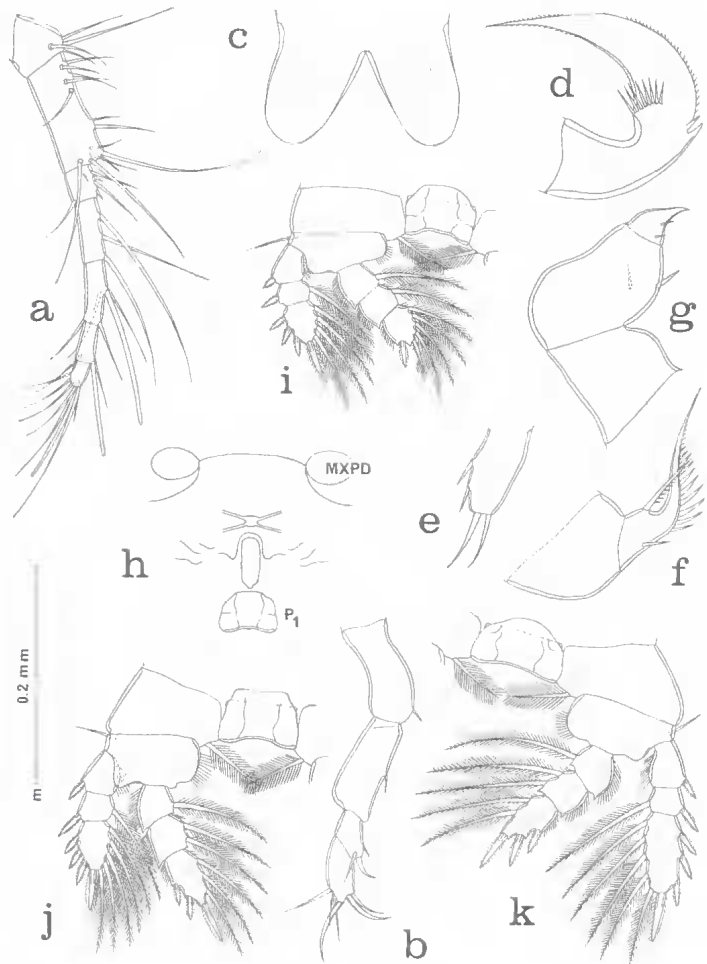


FIG. 2. *Pseudanthessius newmanae*, new species. Female. a, antennule, dorsal (scale B); b, antenna, posterior (E); c, labrum, ventral (C); d, mandible, dorsal (C); e, maxillule, posterior (C); f, maxilla, inner (C); g, maxilliped, postero-inner (C); h, area between maxillipeds and first pair of legs, ventral (B); i, leg 1 and intercoxal plate, anterior (B); j, leg 2 and intercoxal plate, anterior (B); k, leg 3 and intercoxal plate, anterior (B). MXP = maxilliped. P1 = leg 1.

TABLE 1. *Pseudanthessius newmanae*, new species. Formula for armature.

	coxa	basis	exopod			endopod		
P <sub>1</sub>	0-1	1-0	I-0;	I-1;	III,I,4	I-0;	0-1;	III,I,4
P <sub>2</sub>	0-1	1-0	I-0;	I-1;	III,I,5	0-1;	0-2;	II,I,3
P <sub>3</sub>	0-1	1-0	I-0;	I-1;	III,I,5	0-1;	0-2;	II,I,2
P <sub>4</sub>	0-1	1-0	I-0;	I-1;	II,I,5	II		

3f) 165  $\mu\text{m}$  long, bearing proximally 2 unequal setae, longer seta with few setules on inner side, and having large terminal lamella and small subterminal tooth.

Ventral area between maxillipeds and first pair of legs as in female.

Legs 1-4 segmented and armed as in female, except for sexual dimorphism in endopod of leg 1, with clawlike process and reduced first seta (Fig. 3g, h).

Leg 5 (Fig. 3d) as in female.

Leg 6 (Fig. 3d, i) postero-ventral flap on genital somite bearing 2 setae.

Spermatophore (Fig. 3j), seen only inside genital somite of male, elongate, 135 x 44  $\mu\text{m}$ .

**ETYMOLOGY.** The new species is named for Leslie J. Newman, University of Queensland, who sent the copepods to me for study.

**REMARKS.** Only one species of *Pseudanthessius* has been recorded as associated with marine flatworms. *Pseudanthessius latus* Illg, 1950, lives on a polyclad turbellarian, *Kaburakia excelsa* Bock (see Faubel, 1983) (= *Cryptophallus magnus* Freeman), on the coasts of Washington and California (Illg, 1950). As Illg (1950) pointed out, Wilson's (1935) specimens of *Pseudanthessius obscurus* (A. Scott, 1909), from large gray flatworms in California, are *P. latus*.

*Pseudanthessius newmaniae* differs from *P. latus* as follows: the average length of the female is 1.44 mm (versus 1.82 mm in *P. latus*), the second segment of the antennule is relatively short (versus exceeding the combined lengths of the five terminal segments in *P. latus*), the ratio of the length to the width of the caudal ramus is 2.87:1 (versus approximately 6:1 in Illg's fig. 1k), and the endopod of leg 4 is elongate (versus inflated in Illg's fig. 1i).

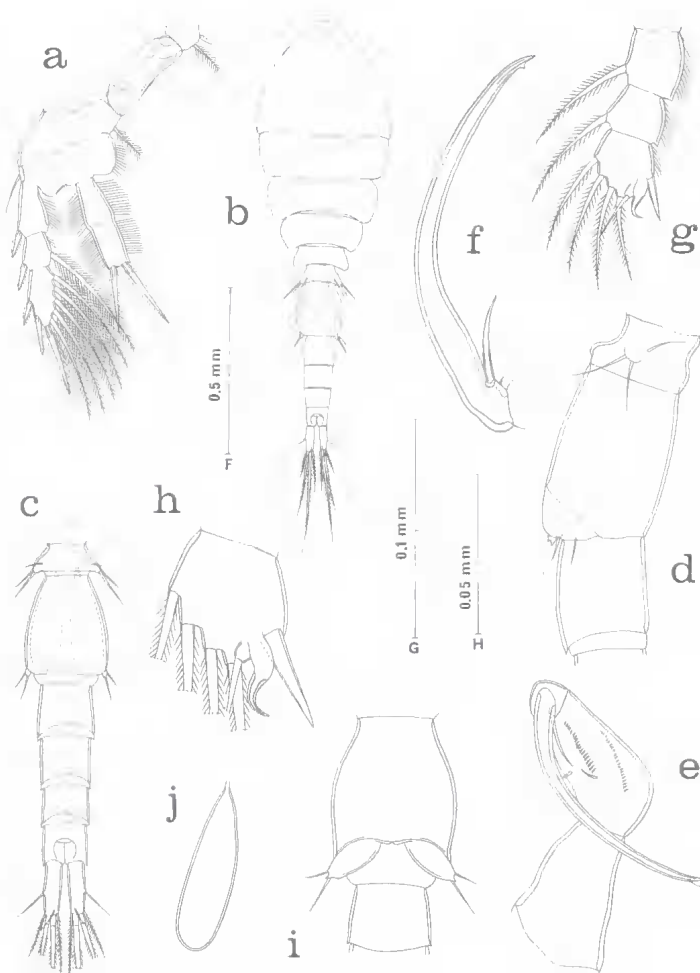


FIG. 3. *Pseudanthessius newmaniae*, new species. Female. a, leg 4 and intercoxal plate, anterior (scale B). Male. b, body, dorsal (F); c, urosome, dorsal (B); d, somite bearing leg 5, genital somite, and first postgenital somite, lateral (E); e, maxilliped, postero-inner (C); f, claw of maxilliped, antero-outer (G); g, endopod of leg 1, anterior (C); h, third segment of endopod of leg 1, anterior (H); i, genital somite and first postgenital somite, showing leg 6, ventral (E); j, spermatophore, inside body of male, lateral (E).

A combination of characters of the female will serve to separate the new species from its 37 congeners. In 16 species of *Pseudanthessius* the length of the body is less than 1 mm. In 12 species the ratio of length to width of the caudal ramus is 3.5:1 or more. In 5 species the ratio of the caudal ramus is less than 2:1. Three species cannot be distinguished from the new species by these criteria, but show other characters by which they may be separated from *P. newmaniae*. In

*Pseudanthessius sauvagei* Canu, 1891, the genital double-somite of the female is slender, about 1.7:1, not laterally expanded, and the fourth segment of the antennule is elongate. In *P. spinifer* Lindberg, 1946, the genital double-somite of the female in dorsal view has pointed lateral processes and the mandible has a long slender blade. In *P. vimulus* Humes, 1977, the genital double-somite of the female is quadrate and the longest seta of leg 5 is longer than the genital somite. In one species, *Pseudanthessius faouzi* Steuer, 1940: 21, the female is unknown. The male of *P. faouzi* differs from the male of the new species in that the length of the body is 0.574 mm, and the caudal ramus is approximately 2:1.

The nature of the sexual dimorphism in the third segment of the endopod of leg 1 of the male, with a clawlike process between the spine and the reduced first seta, is unique among the 22 species of *Pseudanthessius* where males are known and where the endopod of leg 1 has been described or illustrated.

*Pseudanthessius newmaniae* occurs on three species of pseudocerotid worms (two of them undescribed) on both eastern and western coasts of Australia. The nature of the association of the copepods with the flatworms is not known. The copepods move actively on the host, and may perhaps feed on the mucus of the worms. It is of interest that *Typhlosoceros lizardensis* is very toxic (L.J. Newman, in correspondence).

#### ACKNOWLEDGEMENTS

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